

Application No. 10/707,252  
Docket No. 13DV-14265  
Amendment dated January 6, 2005  
Reply to Office Action of October 6, 2004

**Amendments to the Specification:**

Please replace paragraph [0015] with the following amended paragraph:

[0015] Represented in Figure 2 is a TBC system 20 in accordance with an embodiment of the invention. As shown, the coating system 20 includes a ceramic layer 26 bonded to the blade substrate 22 with an overlay coating 24, which therefor serves as a bond coat to the ceramic layer 26. The substrate 22 (blade 10) is preferably a high-temperature material, such as an iron, nickel or cobalt-base superalloy. To attain the strain-tolerant columnar grain structure 30 ~~structure~~ represented in Figure 2, the ceramic layer 26 is preferably deposited by physical vapor deposition (PVD), though other plasma spray deposition techniques could be used. A preferred material for the ceramic layer 26 is an yttria-stabilized zirconia (YSZ), with a suitable composition being about 3 to about 20 weight percent yttria, though other ceramic materials could be used, such as yttria, nonstabilized zirconia, or zirconia stabilized by ceria ( $\text{CeO}_2$ ), scandia ( $\text{Sc}_2\text{O}_3$ ) or other oxides. The ceramic layer 26 is deposited to a thickness that is sufficient to provide the required thermal protection for the underlying substrate 22 and blade 10, generally on the order of about 100 to about 300 micrometers. As with prior

Application No. 10/707,252  
Docket No. 13DV-14265  
Amendment dated January 6, 2005  
Reply to Office Action of October 6, 2004

art TBC systems, the overlay coating 24 contains sufficient aluminum so that its surface oxidizes to form an adherent oxide layer (scale) 28 to which the ceramic layer 26 chemically bonds.

Please replace paragraph [0019] with the following amended paragraph:

[0019] A suitable chromium content for the outer region 34 of the coating 24 is about 1 to 5 weight percent (about 0.8 to 3.9 atomic percent), preferably about 2 weight percent, while a chromium content of 5 to 20 weight percent (about 4 to 19 atomic percent), preferably about 10 weight percent, is desired for the inner region 32 of the coating 24. The compositions of the NiAl intermetallic within both the inner and outer regions 32 and 34 are preferably alloyed to contain a reactive element, with preferred compositions based on NiAlCrZr. A suitable composition for the inner region 32 is, by weight, about 20% to 30% aluminum, about 5% to 20% chromium, about 0.2 to 1.5% zirconium, and the balance nickel and incidental impurities. A suitable composition for the outer region 34 is, by weight, about 20% to 30% aluminum, about 1% to 5% chromium, about 0.2 to 1.5% zirconium, and the balance nickel and incidental impurities. In a preferred embodiment in which the outer region 34 has a higher aluminum than the inner region 32,

Application No. 10/707,252  
Docket No. 13DV-14265  
Amendment dated January 6, 2005  
Reply to Office Action of October 6, 2004

it is foreseeable that the aluminum content of the inner region 32 could be less than 18 weight percent, in which case a suitable minimum aluminum content for the outer region 34 is at least 18 weight percent. ~~percent, while the aluminum content of the inner region 32 is preferably limited to not more than about 18 weight percent.~~